Esterel Technologies’ SCADE Solutions for ARINC 661 Compliant Systems is a tool suite for the prototyping and design of ARINC 661 compliant and embedded Cockpit Display Systems (CDS) and User Applications (UA).

For CDS developers, the toolchain features a customizable ARINC 661 compliant widgets library delivered as SCADE Suite® and SCADE Display® models, the creation of ARINC 661 configuration files (CF) to define the widgets list and their interfaces, as well as the automated generation of an ARINC 661 Server.

For UA developers, the toolchain features the design of UA pages as models, the automatic generation of standard binary and XML Definition Files (DF), and the automatic generation of communication code between SCADE Suite UA models and any ARINC 661 Server.

With SCADE Solutions for ARINC 661 Compliant Systems, aircraft manufacturers, CDS developers, and avionics UA developers or integrators can ensure ARINC 661 compliance and drastically increase productivity while achieving the highest level of quality and compliance with the DO-178B/C safety objectives up to Level A, as required for the certification of CDS and UA avionics applications.

Modular, model-based, certifiable and configurable, SCADE Solutions for ARINC 661 Compliant Systems indeed significantly decrease the overall avionics software development and modifications costs. They also decrease the time-to-certification and are an important step in allowing for more modular certification of ARINC 661 compliant aircraft components.

Read more about the toolchain of SCADE Solutions for ARINC 661-compliant CDS and UAs:
- “ARINC 661 Widget Prototyping and Design”
- “ARINC 661 Server Generation”
- “ARINC 661 UA DF Prototyping and Design”
- “ARINC 661 UA and DF Generation”
- “SCADE Tools Integration”

The ARINC 661 Standard

The ARINC 661 standard normalizes the design of interactive CDS and the way the CDS communicates with UAs, such as Flight Management Systems, Flight Control Systems, and Flight Warning Systems, by using predefined and standardized graphical widgets, some of them changeable through pilot interaction (trackball, keyboard, tactile screens, etc), and by standardizing the communication protocol at runtime between a UA and the CDS. ARINC 661 ensures that the full CDS interactively behaves with the avionics systems in the same manner regardless of UA developer and CDS supplier.

Visit the [ARINC 661 web site](https://www.arinc.com) for more details.
ARINC 661 Widget Prototyping and Design

Customizable Widgets Library

To accelerate the development of an ARINC 661 widgets library, the SCADE Widgets Library features a set of customizable SCADE Suite and SCADE Display models, associated Software Requirements Specification (SRS), and Project Documentation data for all ARINC 661-4 standard widgets.

SCADE ARINC 661 Widgets Library Features

Full SCADE ARINC 661 Widgets Library of Models:
- Set of ARINC 661 XML configuration files
- SCADE Suite models for description of the widgets' behavioral logic
- SCADE Display models for description of the widgets' graphical and interactive parts
- Manual C code (when needed), to complete the description of the widgets' behavioral logic, graphical or interactive parts

Widgets Library Software Documentation:
- Software Requirements Specification (SRS) of the Widgets Library, describing the requirements for the look and feel of the widgets
- Design Standards (for SCADE Suite and SCADE Display Design) and Coding Standards (for manual C code) used for the development of the Widgets Library
- Traceability data elements between the various items of the Widgets Library
- Guidelines explaining how the elements of the Widgets Library and its software documentation should be used, customized, and adapted by the end-user within its platform and DO-178B/C certification environment

SCADE Widget Creator

SCADE Widget Creator for ARINC 661 Compliant Systems is a SCADE Suite and SCADE Display add-on allowing aircraft manufacturers and CDS developers to:

- prototype, implement, and customize an ARINC 661 library of widgets (look and behavior) as SCADE Suite and SCADE Display models
- create and manage a set of the ARINC 661 configuration files that define the widgets list, widgets interfaces, and widgets inter-dependencies

Widget Creator Features

Description of ARINC 661 widgets list and interfaces (as XML files):
- List of widgets from customer widgets library
- ARINC 661 constants used in the widgets library
- ARINC 661 types used in the widgets library
- Hierarchy of ARINC 661 widgets (parents and children)
- For each widget, definition of standard ARINC 661 interfaces (DF Parameters, Set Parameters and Events)
- Definition of widget implementation by widget: mapping between the ARINC 661 interfaces and the SCADE Suite/SCADE Display models interfaces and communication channels between widgets

ARINC 661 Widget Model Prototyping, Design (look, behavior, and styleset), Simulation, and Report Generation:
- Design of standard or custom ARINC 661 widgets as SCADE models:
  - SCADE Suite for the behavioral logic
  - SCADE Display for the interactive graphics
  - External C source code (if required)
- Model-level debug and simulation, using SCADE Suite Simulator, of ARINC 661 widget models
**ARINC 661 Server Generation**

**SCADE Server Creator**

SCADE Server Creator for ARINC 661 Compliant Systems allows aircraft manufacturers and CDS developers to automatically generate the majority of the ARINC 661 server C source code, including:

- the widgets library C source code generated from the widget models (created with SCADE Widget Creator or delivered in the SCADE Widgets Library) by using SCADE Suite KCG and SCADE Display KCG;
- the C code corresponding to the widget-dependent parts of the ARINC 661 server - such as DF parsing, server-side communication protocol management, windows and layers logic, drawing scheme, etc. - from a set of ARINC 661 Configuration Files.

In addition to the code generated by SCADE Server Creator, the Server code is completed by C source code corresponding to:

- the core part of the server, independent from the platform architecture (RTOS / HW / drivers), which contains the common services and structures used by various parts of the Server. Modifying this part is required only if new or custom capabilities are needed in the Server;
- the architecture part of the platform-dependent part of the Server, which includes the main loop, the I/O dispatching, OpenGL/video initialization, and the definition of the windows and layers configuration. This part requires end-user customization to match the architecture of the target.

SCADE Server Creator also allows for automatic generation of an executable ARINC 661 server for Windows/PC host machines, out of the ARINC 661 Widgets Library and Configuration Data.

**Server Creator Features**

- Automatic generation of a large part of the ARINC 661 Server source code
- Automatic generation of a readable and printable report from the “ARINC 661 Configuration” files, describing the parameters, creation structure, event structures, or run-time modifiable parameters tables for each widget with the same layout as the ARINC 661 standard specification
- Source code of a configurable ARINC 661 Server
- Automatic generation of binary ARINC 661 Widgets Library, for integration as a WYSIWYG (What You See Is What You Get) environment, into the SCADE UA Page Creator for ARINC 661
- Automatic C source code generation, for integration into the ARINC 661 Server, from an ARINC 661 widgets library

**Generated Server Characteristics**

- Portable (natively works under Windows XP, Windows 7 and Linux)
- Configurable through the ARINC 661 configuration files (customizable list of widgets, customizable widget interfaces – definition or runtime parameters, events, etc. – customizable dependencies between widgets)
- Configurable part of the ARINC 661 Server automatically generated by Server Creator
- Limited and well identified platform dependencies (such as memory management, graphics resource access, main scheduling, etc.)
- Multi UA support, multi DF support
- Mixing ARINC 661 pages with multiple SCADE Display-generated “symbology” layers
- Management of several Display Units (DU), Windows and Layers “configurations”, automatically generated from XML configuration files
- Run-time reconfiguration of the DUs, Windows, and Layers
- Multi-cursors support, multiple “keyboard-like” devices support
- Communication protocol based on Ethernet and TCP/IP (customizable by the user)
SCADE UA Page Creator for ARINC 661 Compliant Systems is a SCADE Display add-on allowing UA designers to prototype and design ARINC 661 UA DF pages as models on the host workstation by instantiation of ARINC 661 widgets and by modeling all DF parameter types, with real-time WYSIWYG feedback, for all standard and custom widgets.

SCADE UA DF Generator for ARINC 661 Compliant Systems is a generation tool that allows one to generate standard binary and XML Definition Files from UA Page Creator ARINC 661 models.

SCADE Suite UA Adaptor for ARINC 661 Compliant Systems is an add-on module of SCADE Suite KCG C Code Generator that allows UA designers to automatically generate the ARINC 661 compliant C communication code between the SCADE Suite UA and the ARINC 661 Server for a given associated DF.

**UA Page Creator Features**
- Creation of ARINC 661 UA DF models by instantiation of ARINC 661 widgets created with SCADE Widget Creator (or delivered by default with the tool)
- Same front-end as SCADE Display, with advanced editing capabilities and ergonomics
- A default ARINC 661 widgets library (binary), enabling fast start design of UA DF pages
- Integration of the host binary ARINC 661 server for WYSIWYG design
- Co-simulation enabled with UAs designed as SCADE Suite models and the ARINC 661 server
- Co-execution enabled with UAs designed as SCADE Suite models and the ARINC 661 server

**SCADE Suite UA Adaptor Features**
- Automatic generation of C communication code for the SCADE Suite UA, corresponding to “set parameters” and “get events”, conform to the ARINC 661 standard, from the connection data between a SCADE Suite UA model and a SCADE UA Page Creator model (or a binary DF)
- Configured by a set of ARINC 661 configuration files (defining widget list and interfaces)
- Dedicated UI for editing of mapping data between UA and DF at the model level
- Co-simulation between a SCADE Suite User Application model and a Definition File based on ARINC 661 host server

**UA DF Generator Features**
- Automatic generation of binary ARINC 661 UA DFs from SCADE UA Page Creator models
- Configured by a set of ARINC 661 configuration files (defining widgets list and interfaces)
- Export of standard XML DF
- Qualifiable as TQL-1 tool under DO-178C
- SCADE UA DF Generator Certification Kit provides all material required by DO-178C for the certification authorities (including TQP, TOR, IRS, TR, TAS, TCI, etc.)

**UA Communication Code Generation for SCADE Suite**
SCADE Suite UA Adaptor for ARINC 661 Compliant Systems is an add-on module of SCADE Suite KCG C Code Generator that allows UA designers to automatically generate the ARINC 661 compliant C communication code between the SCADE Suite UA and the ARINC 661 Server for a given associated DF.
SCADE Tools Integration

Logic Design in SCADE Suite
SCADE Solutions for ARINC 661 Compliant Systems are built on top of SCADE Suite to allow for developing the widgets’ behavior and the User Applications’ logic.

For information on the SCADE Suite product line, see the SCADE Suite technical data sheet.

Graphics Design in SCADE Display
SCADE Solutions for ARINC 661 Compliant Systems are built on top of SCADE Display to allow for developing the interactive symbology of widgets and the layout of UA pages.

For information on the SCADE Display product line, see the SCADE Display technical data sheet.

Application Life Cycle Management
SCADE Solutions for ARINC 661 Compliant Systems integration with SCADE LifeCycle® allows the following capabilities:

• Requirements management and traceability from SCADE UA Page Creator and SCADE Widget Creator with SCADE LifeCycle Requirements Management Gateway¹
• Automatic documentation generation from SCADE UA Page Creator and SCADE Widget Creator with SCADE LifeCycle Reporter
• Integration with SCADE LifeCycle Reporter and SCADE LifeCycle Requirements Management Gateway shared with SCADE Display

For information on the SCADE LifeCycle product line, see the SCADE LifeCycle technical data sheet.

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### Minimal/Required System Configuration

<table>
<thead>
<tr>
<th><strong>OS Platforms</strong></th>
<th>Microsoft® Windows XP Professional SP3 or Windows 7 SP1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CPU processor</strong></td>
<td>1.5 GHz or faster</td>
</tr>
<tr>
<td><strong>RAM</strong></td>
<td>1 GB minimum (2 GB recommended)</td>
</tr>
<tr>
<td><strong>Disk Space</strong></td>
<td>1 GB minimum</td>
</tr>
<tr>
<td><strong>Peripherals</strong></td>
<td>CD-ROM drive for installation</td>
</tr>
<tr>
<td><strong>Protocol</strong></td>
<td>Network adapter and TCP/IP installed and configured</td>
</tr>
<tr>
<td><strong>Display</strong></td>
<td>16-bit color, 1280x1024 screen resolution recommended</td>
</tr>
</tbody>
</table>

### SCADE Solutions for ARINC 661 Compliant Systems

**ARINC 661 CDS Design Environment:**
- SCADE Widgets Library for ARINC 661 Compliant Systems
- SCADE Widget Creator for ARINC 661 Compliant Systems
- SCADE Server Creator for ARINC 661 Compliant Systems
- SCADE LifeCycle Requirements Management Gateway

**ARINC 661 UA Design Environment:**
- SCADE UA Page Creator for ARINC 661 Compliant Systems
- SCADE UA DF Generator for ARINC 661 Compliant Systems
- SCADE Suite UA Adaptor for ARINC 661
- SCADE LifeCycle Reporter for SCADE UA Page Creator
- SCADE LifeCycle Requirements Management Gateway

SCADE Display with Widget Creator and UA Page environments
- SCADE Solutions for ARINC 661 User Documentation and Online Help
- SCADE UA DF Generator DO-178C Level A Certification Kit

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**Contact Information**

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Contact one of our Sales representatives at
scade-sales@esterel-technologies.com

Direct general questions about Esterel Technologies to
scade-info@esterel-technologies.com

Discover the latest news on our products and technology at
http://www.esterel-technologies.com

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